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EXAMINER

LAO, TIM P

ART UNIT	PAPER NUMBER
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2655

DATE MAILED: 04/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/847,139

Applicant(s)

MANGU ET AL.

Examiner

Tim Lao

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

1. In response to the Office Action of November 17, 2003, Applicants have submitted an Amendment, filed February 19, 2004, amending claims 1, 6, 10, 12, 14, 15, and 17-23 and canceling claim 3, and arguing to overcome the art rejections. Claims 1-2 and 4-23 are pending in this application. Of the pending claims, claims 1, 10, and 18-23 are independent claims.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 1-2 and 4-23 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 12 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5. Claim 12 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 12, as best understood from the description in the specification, The corrective rule is applied in two cases: (1) If the difference in posterior probabilities between the first and second candidate is less than a threshold (see p.9, ll.1-4 of the specification); (2) If the first candidate word has posterior probability less than a threshold (see p.10, ll.1-4 and p.11, ll.3-13). Thus, the feature "applying at least one of the corrective rules to the real-time confusion set when the second candidate word has a posterior probability that is not greater than a predetermined threshold" is not supported in the original disclosure. In addition, it is not clear how the rule is applied when the second candidate has a posterior probability less than a threshold as claimed in claim 12.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 12 recites the limitation "the second candidate" in 3<sup>rd</sup> paragraph of the claim beginning with "applying at least ...". There is insufficient antecedent basis for this limitation in the claim.

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-2, 6-7, 18, 20, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Pokhariyal et al. (U.S. Patent Application Publication 2002/0123876 A1).

Claim(s)

1

Pokhariyal et al. disclose:

A method for correcting errors for consensus decoding of speech, the method comprising the steps of:

creating a confusion set (e.g., set1: 'to', 'two', 'too'; or set2: 'to ohm', 'Tom') comprising a plurality of candidate words (e.g., 'to', 'two', 'too'; or 'to ohm', 'Tom'), each of said candidate words having an associated score (confidence level) and corresponding to an acoustic event (e.g., the sentence "send mail to Tom" spoken by a user, p.5, ¶ 0077, ll.1-4); (p.5, ¶ 0077-0079; p.6, ¶ 0079)

selecting a candidate word (e.g., 'Tom') from the confusion set (e.g., 'to ohm', 'Tom') as a word recognized for the acoustic event (e.g., "send mail to Tom", p.5, ¶ 0077, ll.1-4), wherein a candidate word ('Tom') other than a candidate word ("to ohm") having a highest associated score (confidence level) is selected when one or more criteria (e.g., the candidate word with the second highest confidence level is selected when the candidate word with the highest confidence level is an artificial phoneme combination) are met; (p.6, ¶ 0079-0080) and

*{1. Generic words are represented by phoneme combinations. (p. 5, ¶ 0074, ll.17-18)*

*2. 'to ohm' is assigned a higher confidence than 'Tom'. (p.6, ¶ 0079, ll.13-15)*

*3. Both 'to ohm' and 'Tom' are generic words (p.6, ¶ 0079, ll.9-13). However, because 'to ohm' represents an artificial phoneme combination, 'Tom' is a more likely candidate (p.8, ¶*

	<p>0080, II.1-4). Therefore, the criteria would be when the candidate word with the highest confidence level is an artificial phoneme combination, the candidate word with the second highest confidence level is selected (p.6, ¶ 0080, II.4-7).}</p> <p>outputting the selected candidate word ('Tom') as the word recognized for the acoustic event ("send mail to Tom", p.5, ¶ 0077, II.1). (p.6, ¶ 0080, II.4-7; p.5, ¶ 0074, II.21-22) {The candidate word 'Tom' is outputted as text <b>108</b> by the speech adapter <b>102</b>. (p.5, ¶ 0074, II.21-22)}</p>
Claim(s) 2	<p><u>Pokhariyal et al. disclose:</u></p> <p>The method of claim 1, wherein the step of selecting a candidate word further comprises the step of applying a rule to the confusion set ('to ohm', 'Tom'), the rule determining which of the candidate words ('to ohm' or 'Tom') is selected. (p.6, ¶ 0079-0080) {The rule is when the candidate word with the highest confidence level is an artificial phoneme combination, the candidate word with the second highest confidence level is selected}</p>
Claim(s) 6	<p><u>Pokhariyal et al. disclose:</u></p> <p>The method of claim 1, further comprising the step of learning when to select a candidate word (e.g., 'Tom') other than a candidate word ('to ohm') having a highest associated score. (p.6, ¶ 0079-0080) {e.g., the candidate word with the second highest confidence level is selected when the candidate word with the highest confidence level is an artificial phoneme combination.}</p>
Claim(s) 7	<p><u>Pokhariyal et al. disclose:</u></p> <p>The method of claim 1, wherein said associated score (confidence level) is a posterior probability (e.g., probability that the candidate word is the most probable word spoken). (p.3, ¶ 0038) {Confidence level is determined from probability analysis and is assigned to candidate words as an indication of the most probable words spoken by a user. (p.3, ¶ 0038)}</p>
Claim(s)	<u>Pokhariyal et al. disclose:</u>

18	<p>a memory (Fig.6: 604) that stores computer-readable code (Fig.6: 626); and</p> <p>a processor (Fig.6: 602) operatively coupled to said memory (Fig.6: 604), said processor configured to implement said computer-readable code (Fig.6: 626), said computer-readable code configured to:</p> <p>creating a confusion set (e.g., set1: 'to', 'two', 'too'; or set2: 'to ohm', 'Tom') comprising a plurality of candidate words (e.g., 'to', 'two', 'too'; or 'to ohm', 'Tom'), each of said candidate words having an associated score (confidence level) and corresponding to an acoustic event (e.g., the sentence "send mail to Tom" spoken by a user, p.5, ¶ 0077, ll.1-4); (p.5, ¶ 0077-0079; p.6, ¶ 0079)</p> <p>selecting a candidate word (e.g., 'Tom') from the confusion set (e.g., 'to ohm', 'Tom') as a word recognized for the acoustic event (e.g., "send mail to Tom", p.5, ¶ 0077, ll.1-4), wherein a candidate word ('Tom') other than a candidate word ("to ohm") having a highest associated score (confidence level) is selected when one or more criteria (e.g., the candidate word with the second highest confidence level is selected when the candidate word with the highest confidence level is an artificial phoneme combination) are met; (p.6, ¶ 0079-0080) and</p> <p><i>{1. Generic words are represented by phoneme combinations. (p.5, ¶ 0074, ll.17-18)</i></p> <p><i>2. 'to ohm' is assigned a higher confidence than 'Tom'. (p.6, ¶ 0079, ll.13-15)</i></p> <p><i>3. Both 'to ohm' and 'Tom' are generic words (p.6, ¶ 0079, ll.9-13). However, because 'to ohm' represents an artificial phoneme combination, 'Tom' is a more likely candidate (p.8, ¶ 0080, ll.1-4). Therefore, the criteria would be when the candidate word with the highest confidence level is an artificial phoneme combination, the candidate word with the second highest confidence level is selected (p.6, ¶ 0080, ll.4-7).}</i></p> <p>outputting the selected candidate word ('Tom') as the word recognized for the acoustic event ("send mail to Tom", p.5, ¶ 0077, ll.1). (p.6, ¶ 0080, ll.4-7; p.5, ¶ 0074, ll.21-22) <i>{The candidate word 'Tom' is outputted as text 108 by the speech adapter 102. (p.5, ¶ 0074, ll.21-22)}</i></p>
Claim(s) 20	<u>Pokhariyal et al. disclose:</u>

	<p>An article of manufacture (computer system, Fig.6: 600) for correcting errors for consensus decoding of speech, comprising:</p> <p>a computer readable medium (Fig.6: 624) having computer readable code (Fig.6: 626) means embodied thereon, said computer readable program code (Fig.6: 626) means comprising:</p> <p>a step to create a confusion set (e.g., set1: 'to', 'two', 'too'; or set2: 'to ohm', 'Tom') comprising a plurality of candidate words (e.g., 'to', 'two', 'too'; or 'to ohm', 'Tom'), each of said candidate words having an associated score (confidence level) and corresponding to an acoustic event (e.g., the sentence "send mail to Tom" spoken by a user, p.5, ¶ 0077, ll.1-4); (p.5, ¶ 0077-0079; p.6, ¶ 0079)</p> <p>a step to select a candidate word (e.g., 'Tom') from the confusion set (e.g., 'to ohm', 'Tom') as a word recognized for the acoustic event (e.g., "send mail to Tom", p.5, ¶ 0077, ll.1), wherein a candidate word ('Tom') other than a candidate word ("to ohm") having a highest associated score (confidence level) is selected when one or more criteria (e.g., the candidate word with the second highest confidence level is selected when the candidate word with the highest confidence level is an artificial phoneme combination) are met; (p.6, ¶ 0079-0080) and</p> <p>{1. Generic words are represented by phoneme combinations. (p.5, ¶ 0074, ll.17-18)  2. 'to ohm' is assigned a higher confidence than 'Tom'. (p.6, ¶ 0079, ll.13-15)  3. Both 'to ohm' and 'Tom' are generic words (p.6, ¶ 0079, ll.9-13). However, because 'to ohm' represents an artificial phoneme combination, 'Tom' is a more likely candidate (p.8, ¶ 0080, ll.1-4). Therefore, the criteria would be when the candidate word with the highest confidence level is an artificial phoneme combination, the candidate word with the second highest confidence level is selected (p.6, ¶ 0080, ll.4-7).}</p> <p>a step to output the selected candidate word ('Tom') as the word recognized for the acoustic event ("send mail to Tom", p.5, ¶ 0077, ll.1). (p.6, ¶ 0080, ll.4-7; p.5, ¶ 0074, ll.21-22) {The candidate word 'Tom' is outputted as text 108 by the speech adapter 102. (p.5, ¶ 0074, ll.21-22)}</p>
Claim(s) 22	<u>Pokhariyal et al. disclose:</u>

	<p>A system (computer system, Fig.6: 600) for correcting errors for consensus decoding of speech, comprising:</p> <p>means for creating a confusion set (e.g., set1: 'to', 'two', 'too'; or set2: 'to ohm', 'Tom') comprising a plurality of candidate words (e.g., 'to', 'two', 'too'; or 'to ohm', 'Tom'), each of said candidate words having an associated score (confidence level) and corresponding to an acoustic event (e.g., the sentence "send mail to Tom" spoken by a user, p.5, ¶ 0077, ll.1-4); (p.5, ¶ 0077-0079; p.6, ¶ 0079)</p> <p>means for selecting a candidate word (e.g., 'Tom') from the confusion set (e.g., 'to ohm', 'Tom') as a word recognized for the acoustic event (e.g., "send mail to Tom", p.5, ¶ 0077, ll.1), wherein a candidate word ('Tom') other than a candidate word ("to ohm") having a highest associated score (confidence level) is selected when one or more criteria (e.g., the candidate word with the second highest confidence level is selected when the candidate word with the highest confidence level is an artificial phoneme combination) are met; (p.6, ¶ 0079-0080) and</p> <p><i>{1. Generic words are represented by phoneme combinations. (p.5, ¶ 0074, ll.17-18)</i></p> <p><i>2. 'to ohm' is assigned a higher confidence than 'Tom'. (p.6, ¶ 0079, ll.13-15)</i></p> <p><i>3. Both 'to ohm' and 'Tom' are generic words (p.6, ¶ 0079, ll.9-13). However, because 'to ohm' represents an artificial phoneme combination, 'Tom' is a more likely candidate (p.8, ¶ 0080, ll.1-4). Therefore, the criteria would be when the candidate word with the highest confidence level is an artificial phoneme combination, the candidate word with the second highest confidence level is selected (p.6, ¶ 0080, ll.4-7).}</i></p> <p>outputting the selected candidate word ('Tom') as the word recognized for the acoustic event ("send mail to Tom", p.5, ¶ 0077, ll.1). (p.6, ¶ 0080, ll.4-7; p.5, ¶ 0074, ll.21-22) <i>{The candidate word 'Tom' is outputted as text 108 by the speech adapter 102. (p.5, ¶ 0074, ll.21-22)}</i></p>
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10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pokhariyal et al. (U.S. Patent Application Publication 2002/0123876 A1) in view of Golding et al. (U.S. Patent 5,485,372).

Claim(s)

4

Pokhariyal et al. show:

The method of claim 2, wherein the step of applying further comprises the steps of:

applying the rule (e.g., the rule that determines whether 'to ohm' or 'Tom' is selected) to the confusion set ('to ohm' or 'Tom'), wherein the step of applying selects one of the candidate words ('Tom') in the confusion set; (p.6, ¶ 0079-0080) and

selecting the candidate word ('Tom') having the posterior probability (second highest confidence level) that is greater than a predetermined threshold when this candidate word has a posterior probability that is greater than a predetermined threshold. (p.6, ¶ 0079-0080)

*{1. Confidence level is determined from probability analysis and is assigned to candidate words as an indication of the most probable words spoken by a user. (p.3, ¶ 0038)*

*2. The second highest confidence level would be considered higher than a threshold.}*

Pokhariyal et al. do not show:

applying a rule to the confusion set when a candidate word in the confusion set has a posterior probability that is not greater than a predetermined threshold.

However, Golding et al. teach:

applying a rule (e.g., a rule to select sentence S1 or S2, Fig.2A: **44, 46**) to the confusion set (part of speech sequence T1, T2, Fig.2A: **38, 40**) when a candidate word (T1

	<p>38) in the confusion set has a posterior probability (P1 38) that is not greater than a predetermined threshold (i.e. <math>P1 &lt; P2 + \epsilon</math>). (col.8, ll.31-62)</p> <p><i>{Part of speech sequence T1 and T2 contain list of confusable word candidates 36.}</i></p> <p>It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the speech decoding method of Pokhariyal et al. to include the method applying a rule as taught by Golding et al. in order to apply the rule to a confusion set when a candidate word in the confusion set has a posterior probability that is not greater than a predetermined threshold. One of ordinary skill in the art at the time the invention was made would be able to apply the rule to select candidate sentences or candidate words. The benefit obtained from the combined arts would be the ascertainment of the correct word between the two candidates. (Golding, col.8, ll. 22-30)</p>
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12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pokhariyal et al. (U.S. Patent Application Publication 2002/0123876 A1) in view of Mangu et al. ("Automatic rule acquisition for spelling correction" ICML 1997).

Claim(s) 5	<p><u>Pokhariyal et al. do not show:</u></p> <p>The method of claim 1, further comprising the steps of:</p> <p>determining a plurality of allowable transformations on a plurality of training confusion sets;</p> <p>providing an objective function; and</p> <p>learning a plurality of corrective rules for the training confusion sets, the step of learning using the allowable transformations and objective function.</p> <p><u>However, Mangu et al. teach:</u></p> <p>the steps of:</p>
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	<p>determining a plurality of allowable transformations (p.3, col.1, 2<sup>nd</sup> ¶, part 2; p.4, col.1, 2<sup>nd</sup> ¶ beginning with "The allowable transformations") on a plurality of training confusion sets (Fig.1: "Training Set");</p> <p>providing an objective function (p.3, col.1, 2<sup>nd</sup> ¶, part 3); and</p> <p>learning a plurality of corrective rules (e.g., rules of type a, b, &amp; c: p.4, col.1, 3<sup>rd</sup> ¶) for the training confusion sets (Fig.1: "Training Set"), the step of learning using the allowable transformations (p.4, col.1, 2<sup>nd</sup> ¶) and objective function (p.4, col.1, 4<sup>th</sup> ¶). (p.3, col.1, 3<sup>rd</sup> ¶; p.3, col.2; p.4, col.1)</p> <p>It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the speech decoding method of the Pokhariyal et al. to include the steps of specifying a transformation system as taught by Mangu et al. in order to apply a transformation-based learning method for correcting word errors. The transformation-based learning is a powerful and accurate method for correcting word errors. (Mangu, p.2, col.2, §3; p.4, col.2, 3<sup>rd</sup> ¶)</p>
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13. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pokhariyal et al. (U.S. Patent Application Publication 2002/0123876 A1) in view of Brill ("Transformation-based error-driven learning and natural language processing: A case study in part of speech tagging" 1995).

Claim(s) 8	<p><u>Pokhariyal et al. do not show:</u></p> <p>The method of claim 1, wherein the step of selecting a candidate word further comprises the step of employing a data classifier.</p> <p><u>However, Brill teaches:</u></p> <p>employing a decision-tree data classifier for part of speech tagging. (p.8, §3)</p>
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	<p>It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the speech decoding method of Pokhariyal et al. to include the decision-tree data classifier of Brill in order to select a candidate word other than the candidate word having a highest score. Candidate words can be a proper set of classifications. A candidate word can be determined and selected via trained decision-tree questions (Brill, p.8, §3).</p>
Claim(s) 9	<p><u>The combination of Pokhariyal et al. and Brill would show:</u></p> <p>The method of claim 8, wherein the data classifier is a decision-tree. (Brill, p.8, §3)</p>

14. Claims 10 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mangu et al. ("Automatic rule acquisition for spelling correction," ICML 1997) in view of Bahl et al. ("Constructing groups of acoustically confusable words" ICASSP '90).

Claim(s) 10	<p><u>Mangu et al. show:</u></p> <p>A method (Fig.1) for determining a plurality of corrective rules from a plurality of training confusion sets, the method comprising the steps of:</p> <p>determining a plurality of allowable transformations (p.3, col.1, 2<sup>nd</sup> ¶, part 2; p.4, col.1, 2<sup>nd</sup> ¶ beginning with "The allowable transformations...") on a plurality of training confusion sets (Fig.1: "Training Set");</p> <p>providing an objective function (p.3, col.1, 2<sup>nd</sup> ¶, part 3); and</p> <p>learning a plurality of corrective rules (e.g., rules of type a, b, &amp; c: p.4, col.1, 3<sup>rd</sup> ¶) for the training confusion sets (Fig.1: "Training Set"), the step of learning using the allowable transformations (p.4, col.1, 2<sup>nd</sup> ¶ beginning with "The allowable transformations...") and objective function (p.4, col.1, 4<sup>th</sup> ¶ beginning with "The objective function..."). (p.3, col.1, 3<sup>rd</sup> ¶; p.3, col.2; p.4, col.1)</p>
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	<p><u>Mangu et al. do not show:</u></p> <p>each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals.</p> <p><u>However, Bahl et al. teach:</u></p> <p>each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals. (p.85, §1; p.86, col.2, 4<sup>th</sup> ¶, part 1&amp;2)  <i>{The group of acoustically similar words constructed can be used as a training corpus, e.g., a training confusion set. (see Abstract)}</i></p> <p>It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method of Mangu et al. to include the teaching of Bahl et al. so that the training confusion set can be versatily created. In other words, the training confusion sets can be created by words spoken from individuals or by other means such as text data input or transcriptions of words in a dictionary.</p>
Claim(s) 13	<p><u>Mangu et al. show:</u></p> <p>extracting a plurality of features (e.g., the number of words, <math>w_1 \dots w_n</math>, in the training confusion set C; probability of candidate words in C as determined from 'baseline prediction' of Fig.1) from each of the training confusion sets, each of the features mathematically describing a characteristic of an associated one of the confusion sets. (p.3, § 3.1)</p>
Claim(s) 14	<p><u>Mangu et al. show:</u></p> <p>The method of claim 13, wherein the features comprise one or more of the following:</p> <p>word identity (e.g., the intended word) of at least one of the plurality of candidate words in a training confusion set; (p.3, § 3.1)  <i>{The identity of the intended word has to be known in order for the rules of allowable transformations to be applied to the training confusion set.}</i></p> <p>duration of at least one of the plurality of candidate words in a training confusion set;</p>

	<p>(p.4, col.1, 3<sup>rd</sup> ¶ beginning with "An example of ...") <i>{The words principal and peace indicate different duration of the candidate words, e.g., principal has longer duration than peace.}</i></p> <p>posterior probability of at least one of the plurality of candidate words in a training confusion set; (p.3, § 3.1) <i>{The posterior probability of candidate words in confusion set C as determined from 'baseline prediction' of Fig. 1}</i></p> <p>difference in posterior probabilities of two of the plurality of candidate words in a training confusion set;</p> <p>temporal position of a training confusion set in a sentence comprising a plurality of training confusion sets; (p.4, col.1, 3<sup>rd</sup> ¶ beginning with "An example of ...") and <i>{e.g., the position of 'principle/principal' relative to the word 'school' within a sentence.}</i></p> <p>number of the plurality of candidate words in a training confusion set. (e.g., <math>w_1 \dots w_n \in C</math>; p.3, § 3.1)</p>
Claim(s) 15	<p><u>Mangu et al. show:</u></p> <p>The method of claim 13, wherein each of the allowable transformations comprises a template rule, wherein the step of learning further comprises the step of:</p> <p>instantiating a plurality of template rules (e.g., templates of allowable transformations: p.4, col.1, 2<sup>nd</sup> ¶ beginning with "The allowable transformations..." &amp; 3<sup>rd</sup> ¶), each of the template rules having a form wherein one of the plurality of candidate words (e.g., <math>w_2</math> is chosen) of a confusion set is selected if at least one predetermined criterion is met if at least one predetermined criterion is met (e.g., if the word W occurs within <math>\pm k</math> words of <math>w_1</math>), each criterion comprising a selected feature (e.g., word identity of <math>w_1</math>; temporal position of <math>w_1</math>), an operation (e.g., occur within) and a threshold value (e.g., <math>\pm k</math> words) for the selected feature.</p>
Claim(s) 16	<p><u>Mangu et al. show:</u></p> <p>The method of claim 15, further comprising the steps of:</p>

	<p>providing a baseline predictor; (Fig.1: "baseline prediction")</p> <p>selecting a training confusion set; (Fig.1: "Training Set")</p> <p>determining which of the template rules are applicable to the selected training confusion set, whereby each applicable rule is a candidate rule; (Fig.1: "derive and score candidate rules")</p> <p>determining values of the features in each of the at least one predetermined criteria (e.g., allowable transformations), the values determined from the selected training confusion set; (p.4, col.1, 2<sup>nd</sup> beginning with "The allowable transformations..." &amp; 3<sup>rd</sup> ¶)</p> <p>scoring each of the candidate rules by using the objective function; (Fig.1: "derive and score candidate rules")</p> <p>selecting a highest scoring candidate rule; (Fig.1: "select rule")</p> <p>applying the highest scoring candidate rule to the baseline predictor to create a modified consensus hypothesis; and (Fig.1: "apply rule")</p> <p>selecting the highest scoring candidate rule as a corrective rule. (Fig.1: "Rules")</p>
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15. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mangu et al. ("Automatic rule acquisition for spelling correction," ICML 1997) in view of Bahl et al. ("Constructing groups of acoustically confusable words" ICASSP '90), and further in view of Applicant's admitted prior art.

Claim(s) 11	<p><u>The modified Mangu et al. show:</u></p> <p>applying at least one of the corrective rules (Fig.1, "apply rule") to a training confusion set (Fig.1, "Training Set").</p>
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	<p><u>The modified Mangu et al. do not show:</u></p> <p>determining a real-time confusion set; and</p> <p>applying at least one of the corrective rules to the real-time confusion set.</p> <p><u>Applicant's admitted prior art teaches:</u></p> <p>determining a real-time confusion set (Fig.3). (see Fig.2&amp;3; p.5, ll.18-27)</p> <p>It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method of Mangu and Bahl to include the teaching of Applicant's admitted prior art in order to apply corrective rules to real-time confusion sets. The corrective rule, after being trained on the training confusion set (Mangu, p.3, Fig.1), would be more accurate and less prone to error when applying to a real-time application, e.g., to a real-time confusion set. Moreover, the trained corrective rules should be applied to a real-time confusion in order to serve a useful purpose.</p>
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16. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mangu et al. ("Automatic rule acquisition for spelling correction," ICML 1997) in view of Bahl et al. ("Constructing groups of acoustically confusable words" ICASSP '90), and further in view of Weintraub et al. ("Neural network based measures of confidence for word recognition" ICASSP '97).

Claim(s) 17	<p><u>The modified Mangu et al. show:</u></p> <p>The method of claim 16, wherein the method further comprise the step of providing a truth, the truth indicating a correct word for each of the training confusion sets, wherein the step of scoring comprises the steps of:</p> <p>selecting a candidate rule; (Mangu, Fig.1: "select rule"; p.4, col.1, 3<sup>rd</sup> ¶, rule of type (a))</p>
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	<p>for each of the training confusion sets, performing the following steps:</p> <p>determining if the selected candidate rule chooses or does not choose a correct word (Mangu, p.4, col.1, 3<sup>rd</sup> ¶, rule of type (a)), as determined from the truth (Fig.1: "Truth"), from the candidate words (e.g., principle, principal, Mangu, p.4, col.1, 3<sup>rd</sup> ¶ beginning with "An example of...") in the corresponding one of the confusion sets (Fig.1: "Training Set");</p> <p><u>The modified Mangu et al. do not show:</u></p> <p>providing a value determined from a number of incorrect words selected subtracted by a number of correct words selected.</p> <p><u>However, Weintraub et al. teach:</u></p> <p>providing a value determined from a number of incorrect words selected subtracted by a number of correct words selected. (Fig.1)</p> <p><i>{The number of incorrect words is the number of correct words subtracted by the total number of words in the hypothesis.}</i></p> <p>It would have been obvious to a person of ordinary skill in that art at the time the invention was made to modify the method of the modified Mangu et al. to include the teaching of Weintraub et al. in order to determine the number incorrect words from the number of correct words selected. This information is important for time-alignment of candidate words. (Weintraub, §2: "Word Correctness")</p>
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17. Claims 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brill (U.S. Patent 6,684,201 B1) in view of Mangu et al. ("Automatic rule acquisition for spelling correction," ICML 1997) and Bahl et al. ("Constructing groups of acoustically confusable words" ICASSP '90).

Claim(s)  
19

Brill shows:

A system (Fig.1: 100) for determining a plurality of corrective rules (Fig.1: 122) from a

plurality of training confusion sets (e.g., then/than, weather/whether, col.1, ll.25-35), comprising:

a memory (Fig.1: **106**) that stores computer-readable code (Fig.1: corpus **102**; rules, trees, lists **122**); and

a processor (Fig.1: **102**) operatively coupled to said memory (Fig.1: **106**), said processor configured to implement said computer-readable code (Fig.1: corpus **102**; rules, trees, lists **122**), said computer-readable code configured to:

implement transformation-based learning. (col.8, ll.34-67; col.9, ll.1-38)

Brill does not show:

determining a plurality of allowable transformations on the training confusion sets, each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals;

providing an objective function; and

learning a plurality of corrective rules for the training confusion sets, the step of learning using the allowable transformations and objective function.

Mangu et al. teach:

determining a plurality of allowable transformations (p.3, col.1, 2<sup>nd</sup> ¶, part 2; p.4, col.1, 2<sup>nd</sup> ¶ beginning with "The allowable transformations") on a plurality of training confusion sets (Fig.1: "Training Set");

providing an objective function (p.3, col.1, 2<sup>nd</sup> ¶, part 3); and

learning a plurality of corrective rules (e.g., rules of type a, b, & c: p.4, col.1, 3<sup>rd</sup> ¶) for the training confusion sets (Fig.1: "Training Set"), the step of learning using the allowable transformations (p.4, col.1, 2<sup>nd</sup> ¶) and objective function (p.4, col.1, 4<sup>th</sup> ¶). (p.3, col.1, 3<sup>rd</sup> ¶; p.3, col.2; p.4, col.1)

	<p><u>Bahl et al. teach:</u></p> <p>each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals. (p.85, §1; p.86, col.2, 4<sup>th</sup> ¶, part 1&amp;2) <i>{The group of acoustically similar words constructed can be used as a training corpus, e.g., a training confusion set. (see Abstract)}</i></p> <p><i>{The transformation-based learning method (Brill, Fig.3: 300) of Brill is analogous to the transformation-based learning method (Mangu, Fig.1). (col.2, ll.41-46; col.8, ll.34-67; col.9, ll.1-38)}</i></p> <p>Since Brill, Mangu, and Bahl teach analogous arts, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify computer system of Brill to include the transformation-based learning method of Mangu et al. and Bahl et al. in order to use a computer system configured to determine a set of corrective rules from training confusion sets. The computer system (Fig.1: 100) of Brill includes the necessary hardware (processor 102, memory 104 &amp; 106, I/O 108 &amp; 110) and software (Trainer 130, Corpus 120, Knowledge Base 122) to readily implement the method of Mangu and Bahl with some modifications to the rules in the knowledge base.</p>
Claim(s) 21	<p><u>Brill shows:</u></p> <p>An article of manufacture (Fig.1: 100) for determining a plurality of corrective rules (Fig.1: 122) from a plurality of training confusion sets (e.g., then/than, weather/whether, col.1, ll.25-35), comprising:</p> <p>a computer readable medium (memory 106; col.7 ll.21-22) having computer readable code means (Fig.1: corpus 102; rules, trees, lists 122) embodied thereon, said computer readable program code means comprising:</p> <p>steps to implement transformation-based learning. (col.8, ll.34-67; col.9, ll.1-38)</p> <p><u>Brill does not show:</u></p>

a step to determine a plurality of allowable transformations on the training confusion sets, each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals;

a step to provide an objective function; and

a step to learn a plurality of corrective rules for the training confusion sets, the step of learning using the allowable transformations and objective function.

Mangu et al. teach:

a step to determine a plurality of allowable transformations (p.3, col.1, 2<sup>nd</sup> ¶, part 2; p.4, col.1, 2<sup>nd</sup> ¶ beginning with "The allowable transformations") on a plurality of training confusion sets (Fig.1: "Training Set");

a step to provide an objective function (p.3, col.1, 2<sup>nd</sup> ¶, part 3); and

a step to learn a plurality of corrective rules (e.g., rules of type a, b, & c: p.4, col.1, 3<sup>rd</sup> ¶) for the training confusion sets (Fig.1: "Training Set"), the step of learning using the allowable transformations (p.4, col.1, 2<sup>nd</sup> ¶) and objective function (p.4, col.1, 4<sup>th</sup> ¶). (p.3, col.1, 3<sup>rd</sup> ¶; p.3, col.2; p.4, col.1)

Bahl et al. teach:

each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals. (p.85, §1; p.86, col.2, 4<sup>th</sup> ¶, part 1&2)

*{The group of acoustically similar words constructed can be used as a training corpus, e.g., a training confusion set. (see Abstract)}*

*{The transformation-based learning method (Brill, Fig.3: 300) of Brill is analogous to the tranformation-based learning method (Mangu, Fig.1). (col.2, ll.41-46; col.8, ll.34-67; col.9, ll.1-38)}*

Since Brill, Mangu, and Bahl teach analogous arts, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify computer

	<p>system of Brill to include the transformation-based learning method of Mangu et al. and Bahl et al. in order to use a computer system configured to determine a set of corrective rules from training confusion sets. The computer system (Fig.1: 100) of Brill includes the necessary hardware (processor 102, memory 104 &amp; 106, I/O 108 &amp; 110) and software (Trainer 130, Corpus 120, Knowledge Base 122) to readily implement the steps of Mangu and Bahl with some modifications to the rules in the knowledge base.</p>
Claim(s) 23	<p><u>Brill shows:</u></p> <p>A system (Fig.1: 100) for determining a plurality of corrective rules (Fig.1: 122) from a plurality of training confusion sets (e.g., then/than, weather/whether, col.1, ll.25-35), comprising:</p> <p>means for implementing transformation-based learning. (col.8, ll.34-67; col.9, ll.1-38)</p> <p><u>Brill does not show:</u></p> <p>means for determining a plurality of allowable transformations on the training confusion sets, each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals;</p> <p>means for providing an objective function; and</p> <p>means for learning a plurality of corrective rules for the training confusion sets, the step of learning using the allowable transformations and objective function.</p> <p><u>Mangu et al. teach:</u></p> <p>means for determining a plurality of allowable transformations (p.3, col.1, 2<sup>nd</sup> ¶, part 2; p.4, col.1, 2<sup>nd</sup> ¶ beginning with "The allowable transformations") on a plurality of training confusion sets (Fig.1: "Training Set");</p> <p>means for providing an objective function (p.3, col.1, 2<sup>nd</sup> ¶, part 3); and</p> <p>means for learning a plurality of corrective rules (e.g., rules of type a, b, &amp; c: p.4,</p>

	<p>col.1, 3<sup>rd</sup> ¶) for the training confusion sets (Fig.1: "Training Set"), the step of learning using the allowable transformations (p.4, col.1, 2<sup>nd</sup> ¶) and objective function (p.4, col.1, 4<sup>th</sup> ¶). (p.3, col.1, 3<sup>rd</sup> ¶; p.3, col.2; p.4, col.1)</p> <p><u>Bahl et al. teach:</u></p> <p>each training confusion set comprising a plurality of candidate words determined from utterances of one or more individuals. (p.85, §1; p.86, col.2, 4<sup>th</sup> ¶, part 1&amp;2)</p> <p><i>{The group of acoustically similar words constructed can be used as a training corpus, e.g., a training confusion set. (see Abstract)}</i></p> <p><i>{The transformation-based learning method (Brill, Fig.3: 300) of Brill is analogous to the tranformation-based learning method (Mangu, Fig.1). (col.2, ll.41-46; col.8, ll.34-67; col.9, ll.1-38)}</i></p> <p>Since Brill, Mangu, and Bahl teach analogous arts, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify system of Brill to include the transformation-based learning means of Mangu et al. and Bahl et al. in order to use a system configured to determine a set of corrective rules from training confusion sets. The system (Fig.1: 100) of Brill includes the necessary hardware (processor 102, memory 104 &amp; 106, I/O 108 &amp; 110) and software (Trainer 130, Corpus 120, Knowledge Base 122) to readily implement the means of Mangu and Bahl with some modifications to the rules in the knowledge base.</p>
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### **Conclusion**

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Documents:

[1] L.R. Bahl et al., "A fast approximate acoustic match for large vocabulary speech recognition," IEEE Trans. on Speech and Audio Processing, vol.1, No.1, pp.59-67, Jan. 1993.

[2] A.R. Golding et al., "Combining Trigram-based and feature-based methods for context-sensitive spelling correction," Proc. 34th Annual Meeting of the Association for Computational Linguistics, pp.71-78, 1996.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tim Lao whose telephone number is 703-305-8955.

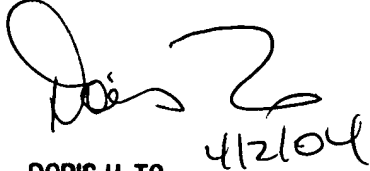
The examiner can normally be reached on M-F, 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tim Lao  
Examiner  
Art Unit 2655

3/25/04

  
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